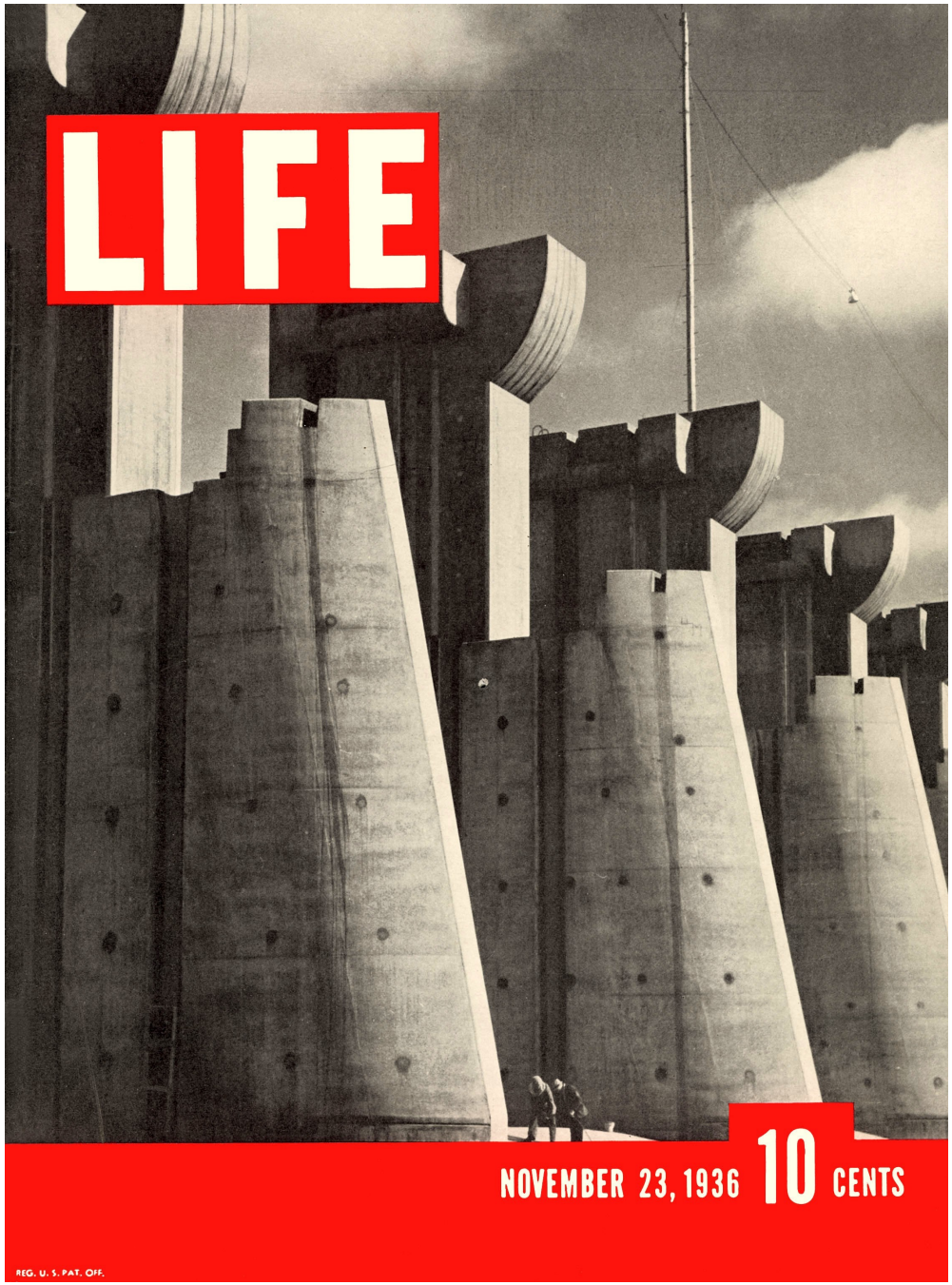

USACE Planning Conference
10 May 2006

Modifications to USACE Dams for Environmental Compliance Purposes

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Northwestern Division

Fort Peck Dam, Montana

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Lower Snake and Columbia Projects
Canada
U.S.
Montana
Columbia R.
Seattle
Washington
Lower Monumental
Little Goose
Lower Granite
Ice Harbor
The Dalles
Idaho
McNary
Portland
Bonneville
John Day
Oregon
N
Snake River

Case History:
Lower Monumental Dam

HISTORY

- 1969 -1972 spillway operated without deflectors
- 1972 To 1974 deflectors constructed (bays 2-7)
- 1979, erosion identified below bay 2
- 1979-2000 diving and hydrographic surveys showed increased erosion
- 1998-1999 Dam Safety Assurance Report
  - INCA/Beck Task Order
    - Recommended model study to determine risk
    - Stopped at 60%

HISTORY CONTINUED

- FY 00 sectional model studies underway
  - Preliminary data shows uplift concerns due to erosion below the slab
- FY 01 general model constructed & tested

Flow Patterns – Profile View

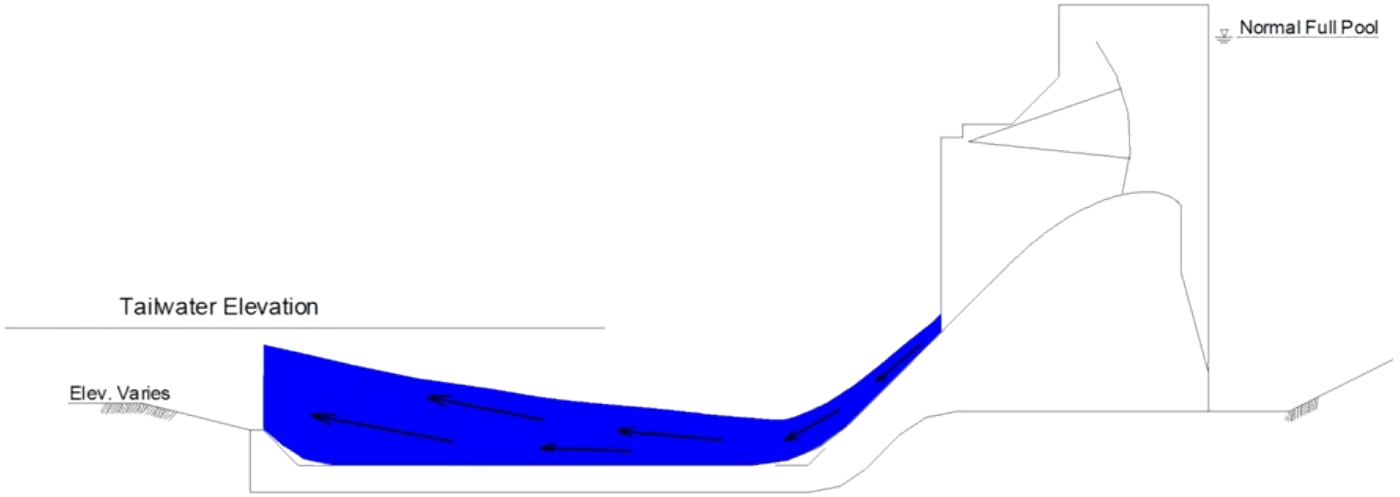


Figure 17 - Plunging Flow

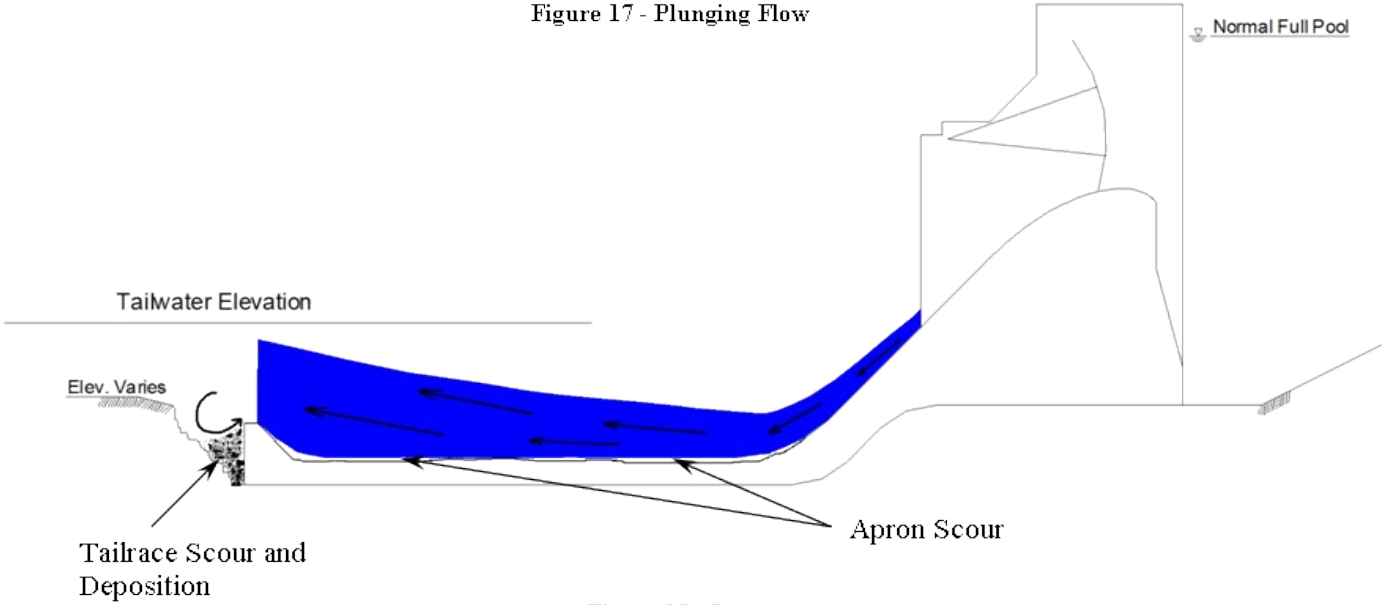
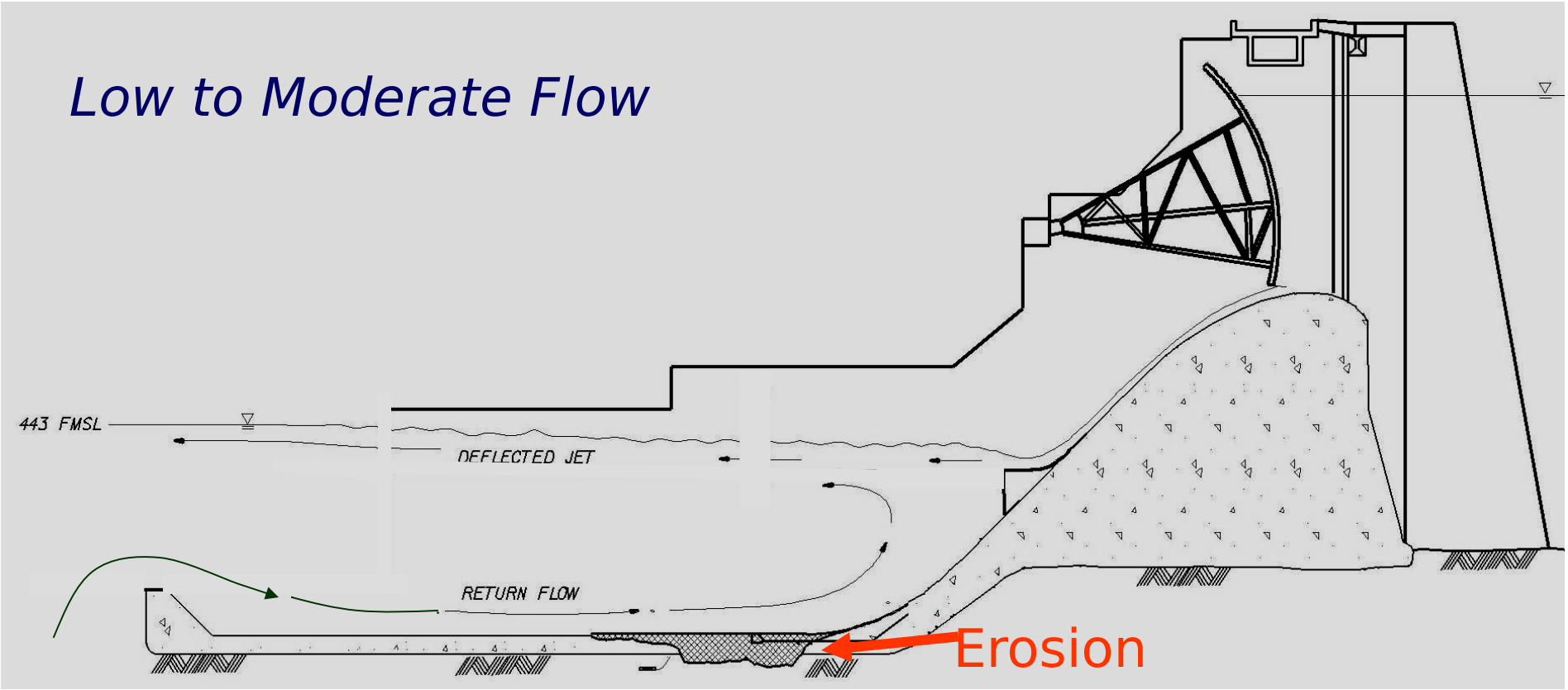


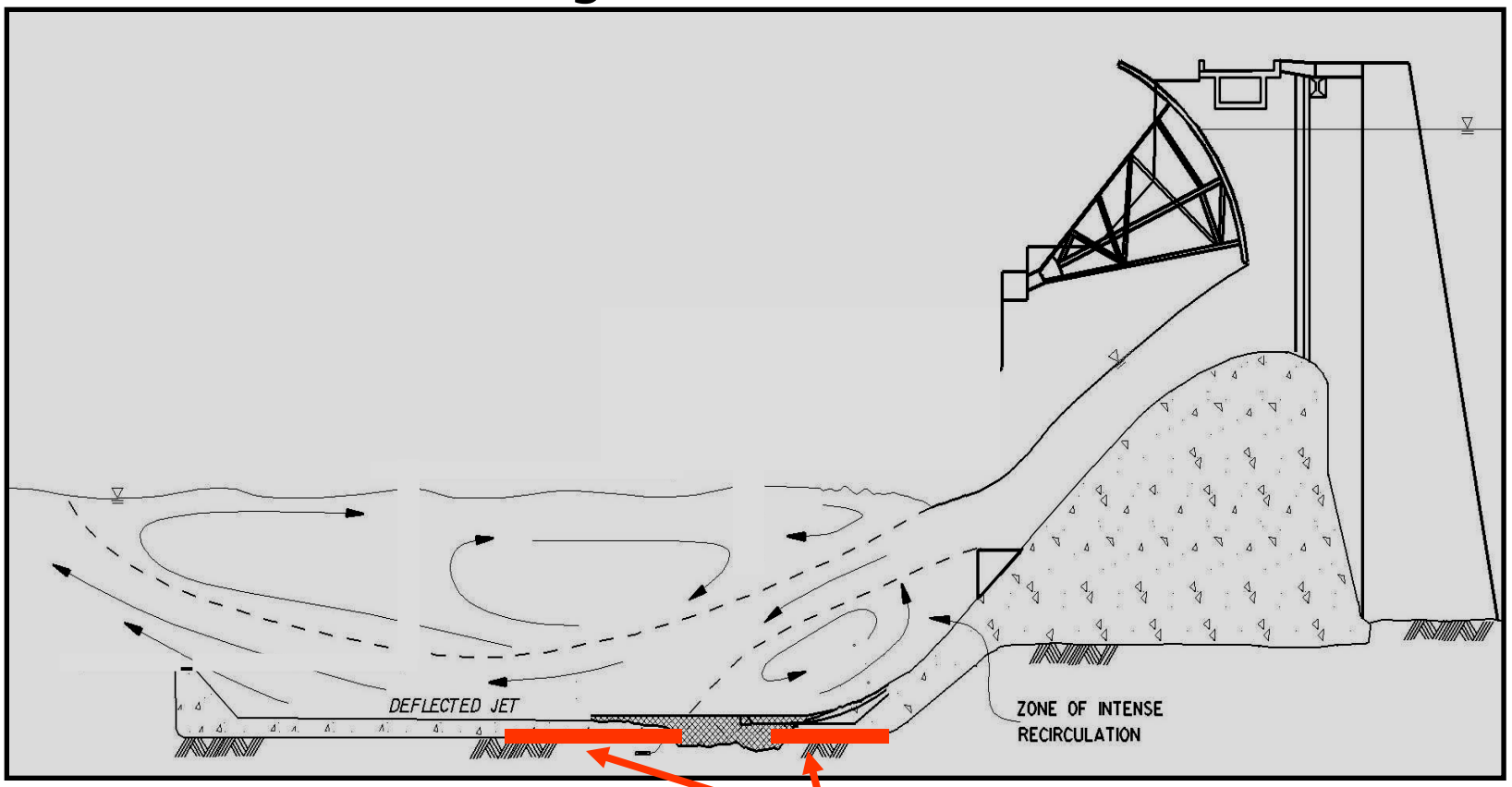
Figure 18 - Impact

Stilling Basin Circulation



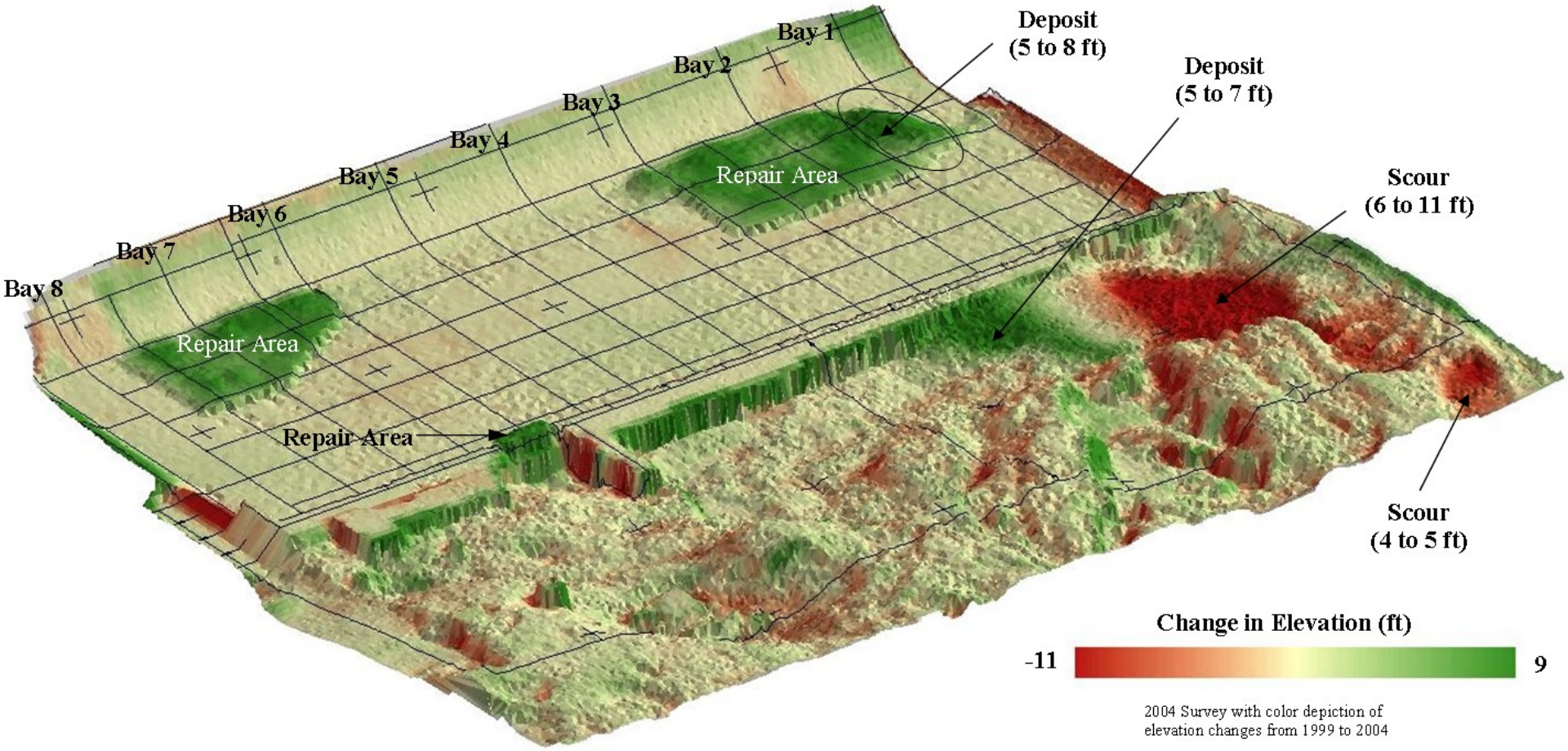
Stilling Basin Circulation

High Flow

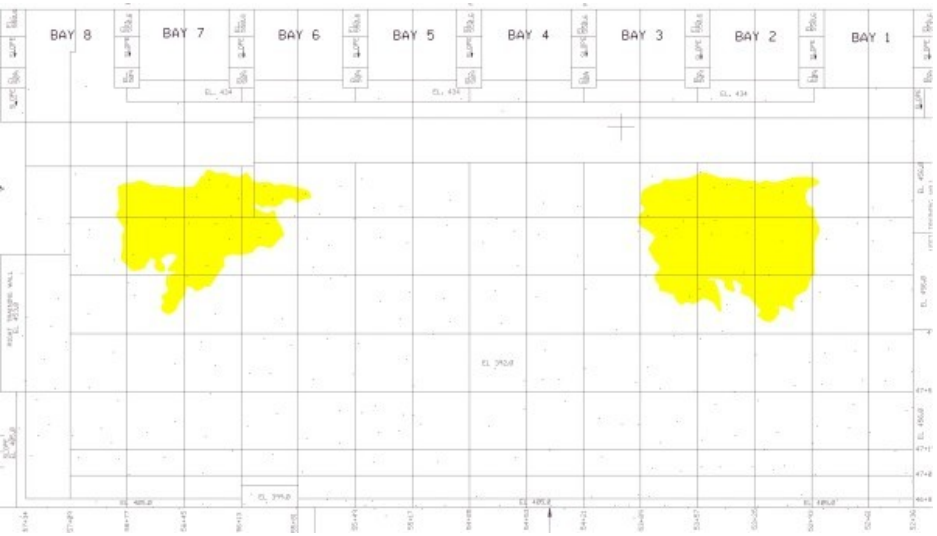


Lower Monumental

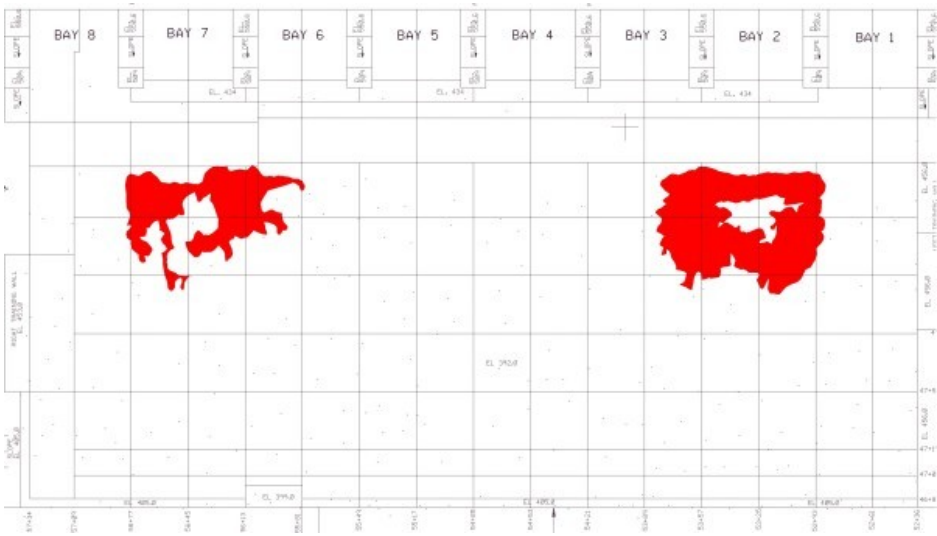
1999-2004



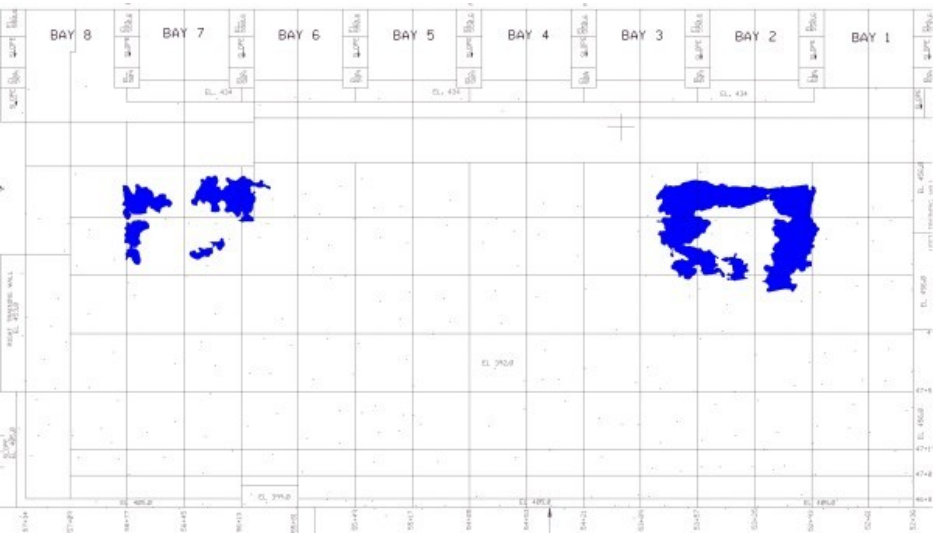
EROSION BELOW ELEVATION 390



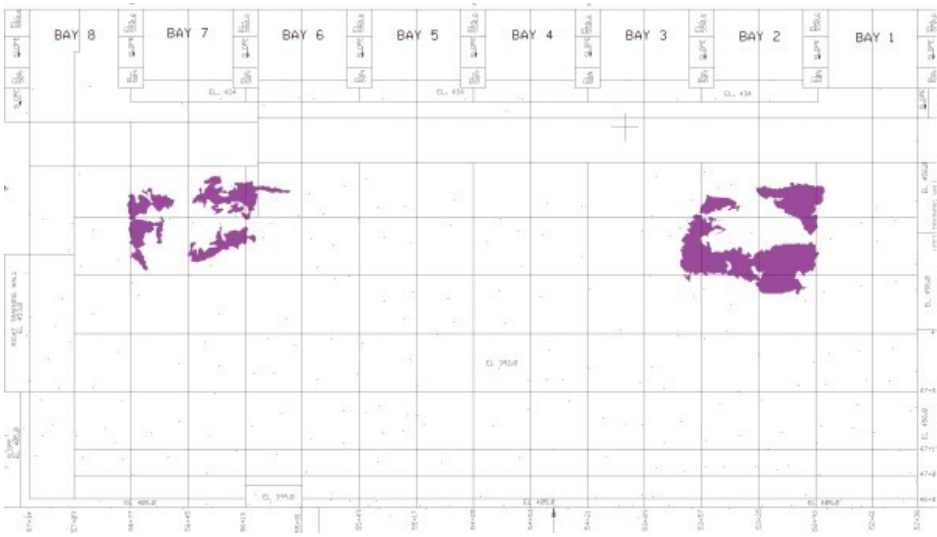
2000



1999

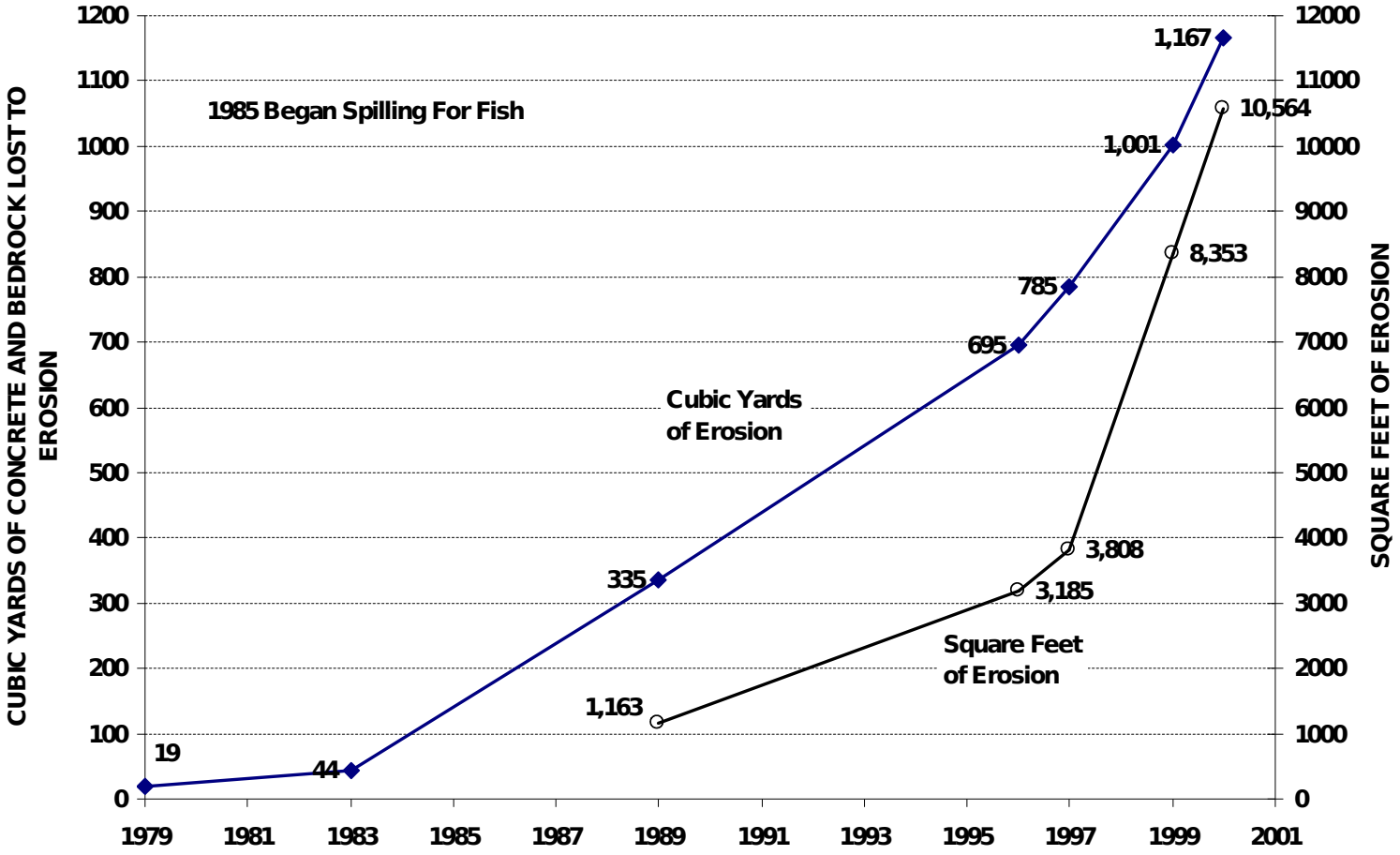


1997



1996

Volume and Area of Erosion Below Design El. 392



FUNDING ISSUES – No easy path to a fix!

- O&M Funding
  - Minimal up front cost for reports
  - Funds not available for other project needs
- CG funding (Major Rehab)
  - Limited O&M funds need not be used for construction
  - O&M up front cost of about $1M for report preparation
  - Requires risk assessment - difficult to be approved by HQ
- CG Funding (Dam Safety Assurance)
  - Difficult to prove overtopping and breaching

2001 – District Dam Safety Officer Imposed an Operational Restriction on the Spillway.

2002 – Received Emergency Supplemental Bill Funding.

Repair Cost was $4,855,440

(We got lucky.)

Lessons Learned

- **Spillways are not designed for routine releases. Flows influenced erosion rates, beyond normal O&M.**
- **Monitoring is extremely valuable.**
- **Authorities that provide funding for modifications do not provide funding for repairing the resultant damage.**
- **Need to consider potential Dam Safety and operational consequences when planning for dam modifications.**

Questions?